

GEOPHILOID CHILOPODS OF THE HAWAIIAN AND OTHER OCEANIC ISLANDS OF THE PACIFIC

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Through the courtesy of N. L. H. Krauss, several small collections of chilopods and millipedes from the Pacific islands have come into the author's hands. These collections have added considerably to the known myriopod fauna of these islands. Thus the present paper contains descriptions of five new species in the Geophilida, three of which represent new genera, these bringing the total number of members of this order now known from these oceanic islands to seventeen. In addition to these new forms, occasion is taken to include descriptions of a new *Mecistocephalus* from Malaya and of a new *Ballophilus* from Hong Kong, the types of which were also collected by Mr. Krauss. The types of the new species are all retained in the author's collection.

SCHENDYLIDAE

Genus NYCTUNGUIS Chamberlin

Nyctunguis Chamberlin, 1914, Bull. Mus. Comp. Harvard, vol. 58, p. 201.
Schendylunguis Verhoeff, 1926, Zool. Anzeiger, vol. 69, p. 101.

A genus represented by many species in Mexico and the western United States.

NYCTUNGUIS BRYANUS Chamberlin

Nyctunguis bryanus Chamberlin, 1926, Bull. Bernice P. Bishop Mus., no. 31, p. 92.

The type of this species was taken on Necker Id. The present collection contains a specimen from Hawaii.

GENUS LANONYX, new

Like *Mexiconyx* of Mexico and *Plesioschendyla* of New Caledonia, in which the coxal pore is similarly single and homogeneous, in lacking ventral pores on the sternites. While agreeing with *Mexiconyx* in possession of a claw on the anal legs, aside from lacking ventral pores, it differs superficially from that genus in the much shorter prehensors.

Generotype *LANONYX LANAIUS*, new species

It is thought best to defer more detailed description of the

mouthparts pending the acquisition of more material, the small size making dissection of the single specimen for the present inadvisable.

LANONYX LANAIUS Chamberlin, new species

A small form of orange color, with legs light yellow; anterior segments showing two lines of spots or blotches along the venter.

Head short, with antennae relatively long, filiform; head fully covering the prehensors in dorsal view.

Prehensors when closed not attaining front margin of head; claws slender; all joints unarmed. Anterior margin of prosternum without teeth but with two low tubercular eminences adjacent to median excision suggesting teeth; chitinous lines faint.

Ventral pores absent.

Last ventral plate very wide. A single large coxal pore on each side, the gland especially large, homogeneous.

Anal leg in the male notably crassate; ending in a well developed claw.

Pairs of legs, 43.

Length, about 12 mm.

LOCATION: Hawaiian Is.: Lanai Id., Lanai Mts. One male taken Nov. 1, 1947 by N. L. H. Krauss.

BALLOPHILIDAE

Genus **THALTHIBIUS** Attems

THALTHIBIUS MICROCEPHALUS Brolemann

Thalthibius microcephalus Brolemann, 1900, Bull. Mus. Nat. Hist. Paris, vol. 15, p. 417.

Recorded from the Mariana Islands. A related species occurs in the Seychelles.

Genus **BALLOPHILUS** Cook

BALLOPHILUS LIBER Chamberlin, new species

Pale yellow, without any inner pigment whatsoever.

Head wider than long, semicircularly rounded anteriorly. Antennae very strongly geniculate, conspicuously clavate beyond the angle; last article much longer than thick. Basal plate shorter than the succeeding tergite.

Ventral pores in a transversely elliptic area which may be more or less constricted at the median line; pores present on sternites back to the fifth from the last; poriferous area not elevated.

Two large coxal pores on each side, these wholly free from the sternite. Last sternite trapeziform.

No anal pores present.

Pairs of legs, 85.

Length, 38 mm.

LOCALITY: Hong Kong. One male taken under bark in May, 1948, by N. L. H. Krauss.

BALLOPHILUS ROUXI Silvestri

This species is like *B. alluadi* Ribaut in lacking pores on the last four sternites. It differs from the former species in lacking all internal pigment and from both in the more strongly clavate antennae, in having the head wider than long as well as in not having the sternal poriferous areas elevated. The number of pairs of legs is the highest recorded for any species.

ORYIDAE

Genus ORPHNAEUS Meinert

ORPHNAEUS BREVILABIATUS (Newport)

Geophilus brevilabiatus Newport, 1845, Trans. Linn. Soc. London, vol. 19, p. 436.

Orphnaeus lividus Meinert, 1870, Naturh. Tidsskr., Ser. 3, vol. 7, p. 19.

Orphnaeus brevilabiatus Haase, 1887, Abh. Mus. Dresden, No. 4, p. 111.

This is probably the most abundant of tropical chilopods, and is generally distributed in islands of the Pacific and Indian areas.

MECISTOCEPHALIDAE

Genus MECISTOCEPHALUS Newport (sens. str.)

Mecistocephalus Newport, 1842, Proc. Zool. Soc. London, vol. 10, p. 178.

Lamnonyx Cook, 1895, Proc. U.S. Nat. Mus., vol. 18, p. 61.

Mecistocephalus (emend.) Chamberlin, 1926, Canad. Ent., vol. 52, p. 184.

The species of this genus now known from the more strictly oceanic islands of the Pacific, i.e. excluding such groups as the Fijis and Solomons, may be separated by means of the following key:

Key to Species of Mecistocephalus

- | | |
|---|----------------------------|
| 1. Pairs of legs 45 | 2 |
| Pairs of legs 47 or 49 | 3 |
| 2. Prefemur of prehensors with 2 teeth | <i>M. spissus</i> (Wood) |
| Prefemur of prehensors with only 1 tooth | <i>M. malayensis</i> sp.n. |
| 3. Pairs of legs 47 | 4 |
| Pairs of legs 49 | 5 |

4. Palpi of second maxillae very short, exceeded by the first maxillae *M. tahitiensis* Wood
 Palpi of second maxillae of usual length (inner corners of lateral pieces of labrum not produced), *M. kraussi* sp. n.
5. Median piece of labrum tridentate *M. tridens* Chamb.
 Median piece of labrum unidentate 6
6. Sternal impressions anteriorly furcate 7
 None of sternal impressions anteriorly furcate .. *M. waikaneus* sp.n.
7. Anterior sternal impressions showing short branches, the others not furcate *M. angustior* Chamb.
 All sternal impressions anteriorly clearly furcate 8
8. Anterior angle of sternal impressions rectangular, last sternite triangular *M. brevisternalis* Tak.
 Anterior angle of sternal impressions very obtuse; last sternite trapeziform *M. maxillaris* (Gervais)

MECISTOCEPHALUS ANGUSTIOR Chamberlin

Mecistocephalus angustior Chamberlin, 1920, Bull. Mus. Comp. Zool. Harvard, vol. 64, p. 59.

Recorded thus far only from the Society Is. (Tahiti).

MECISTOCEPHALUS BREVISTERALIS Takakuwa

Mecistocephalus brevisternalis Takakuwa, 1934, Annot. Zool. Japan, vol. 14, no. 3, p. 362, fig. 11.

Described from the Marshall Is., and so far not reported from elsewhere.

MECISTOCEPHALUS **KRAUSSI** Chamberlin, new species

Head black except the anterior portion of the frontal division which is abruptly lighter, yellowish, the basal plate similarly contrasting in its lighter color. Prosternum and the claw and proximal portion of prehensors also blackish. Dorsum yellow, typically with a longitudinal geminate blackish stripe which for the most part is composed of fine dots and streaks of pigment; similar pigment sometimes showing on the posterior sternites.

Head nearly twice as long as broad; anterior and posterior margins straight; sides converging caudad from level of frontal suture, at first moderately and then more strongly over the caudal third of length. Conspicuously punctate.

Prosternum and prefemur of prehensors conspicuously punctate. Prefemur with two nodular teeth, the other joints with one each and

the claw also at base with a very obtuse angulation or tooth-like eminence.

Anterior clypeus larger than the posterior, bearing the usual six setae. Median piece of labrum moderately wider anteriorly than posteriorly, the sides incurved; caudally blunt, with the apex but slightly free; lateral pieces not produced at inner angles. The palpi of second maxillae extending well beyond the lappets of the first maxillae, the terminal joint with numerous long setae, the second joint bearing fewer similar setae on mesal surface.

Sternal impressions not at all furcate anteriorly.

Last ventral plate moderately trapeziform, its caudal margin gently convex, the lateral margins moderately concave; posterior portion bearing numerous, but not dense, setae. Coxae with a band of well separated setae along mesal border. Coxal in average individuals about 25 on each side.

Pairs of legs, 47.

Length up to 48 mm.

LOCALITY: Palmyra Id. Fourteen specimens taken in Feb., 1948, by N. L. H. Krauss.

Apparently closest to *M. tahitiensis* (Wood), but differing in the longer palpi of the second maxillae, these much exceeding the processes of the first maxillae. The caudolateral corners of the lateral pieces of the labrum not produced as in *tahitiensis*, the coxal pores of which are also fewer.

MECISTOCEPHALUS MALAYENSIS Chamberlin, new species

Body light yellow, the head and prehensors orange.

Head a little more than two thirds as wide as long; narrowed caudad from frontal region, the narrowing more abrupt toward caudal end.

Anterior clypeus much narrower than the posterior. Middle piece of labrum comparatively wide, slightly wider in front than behind, the caudal margin abruptly angular. Palpi of second maxillae long, arching well in front of first maxillae; last joint with a small straight claw and bearing many large setae, the adjacent joint with but few.

Prehensors comparatively short; all joints lacking teeth except the prefemur which has a denticle at distal end.

Sternal impression not furcate, deeply impressed posteriorly, more lightly anteriorly.

Last ventral plate somewhat shield-shaped, the sides convex and the caudal end bluntly rounded. Coxal pores numerous, nearly uniform in size.

Pairs of legs, 45.

Length, 23 mm.

LOCALITY: Malaya. Pahang, Cameron Highlands. Two adult and two young specimens taken in July, 1948, by N. L. H. Krauss.

Differing from *M. diversidens* (Silvestri) of India, which it resembles in number of pairs of legs, in the narrow preclypeus and the broader, caudally strongly narrowed last sternite, etc.

MECISTOCEPHALUS MAXILLARIS (Gervais)

Geophilus maxillaris Gervais, 1837, Ann. Soc. Nat., ser. 2, vol. 7, p. 52.
Lamnonyx maxillaris Silvestri, 1919, Rec. Ind. Mus., vol. 16, p. 61.

Not uncommon in the Society Is., the Marquesas, and other islands of the Pacific. Elsewhere recorded from the West Indies, South America, and west Africa. Occasional in hothouses of Europe and America.

MECISTOCEPHALUS SPISSUS Wood

Mecistocephalus spissus Wood, 1862, Jour. Acad. Nat. Sci. Phila., ser. 2, vol. 5, p. 43.
Lamnonyx spissus Silvestri, 1904, Fauna Hawaiiensis, vol. 3, p. 326, pl. 11, figs. 5-7.

Endemic to the Hawaiian Is. Recorded from Oahu, Kauai, Molokai and Hawaii.

MECISTOCEPHALUS TAHITIENSIS Wood

Mecistocephalus tahitiensis Wood, 1862, Jour. Acad. Nat. Sci., ser. 2, vol. 5, p. 43.
Mecistocephalus tahitiensis porosus Haase, 1887, Abh. Mus. Dresden, no. 5, p. 101, pl. 6, fig. 108.
Lamnonyx tahitiensis Silvestri, Rec. Ind. Mus., vol. 16, p. 74, fig. 18.
Lamnonyx tahitiensis maior Verhoeff, 1925, Ark. Zool., vol. 17, no. 3, p. 45, 47.

Described originally from Tahiti, Society Is. Also occurring in the Marquesas, Samoa, Australia, and New Guinea.

MECISTOCEPHALUS TRIDENS Chamberlin

Mecistocephalus tridens Chamberlin, 1922, Psyche, vol. 29, no. 4, p. 178.
Mecistocephalus tridens Attems, 1929, Das Tierreich, Lief. 52, p. 136.

This species, described originally from Java, is listed by Attems as occurring at Honolulu, but this record is probably to be questioned.

MECISTOCEPHALUS WAIKANEUS Chamberlin, new species

Reddish yellow, the head and prehensors chestnut.

Cephalic plate nearly twice as long as wide; slightly narrowing caudad from the frontal region over about two-thirds of the length, and then more abruptly to caudal end; caudal margin straight, the anterior obtusely subangular. The pleural tooth short and conical, directed straight forward.

Anterior clypeal area much exceeding the posterior, its median length being about four times as long as that of the latter. Median piece of labrum comparatively large, narrowly shield shaped, its acute, subdentiform caudal apex projecting freely beyond margin of lateral pieces. Lateral pieces with caudal margin oblique and nearly straight, the mesal corners not produced. Palpi of second maxillae of normal sternal impression weak, not furcate anteriorly.

Last ventral plate longer than wide, narrow, trapeziform. Coxal pores small, typically seven on each side.

Pairs of legs, 49.

Length, 20 mm.

LOCALITY: Hawaiian Is.: Waikane Id. Two specimens taken in rotten log on Dec. 28, 1928.

GENUS FUSICHILA, new

Differing from all other genera of the Mecistocephalidae in having the labrum composed of a single piece, this probably formed by the fusion of the lateral pieces and the suppression of the median piece. Coxal pores very few in number, the type showing only two on one side, four on the other.

Genotype: *FUSICHILA WAIPAHEENAS* sp. n.

FUSICHILA WAIPAHEENAS Chamberlin, new species

Body in general yellow, the head and prehensors dusky chestnut.

The head nearly twice as long as broad; conspicuously narrowed over posterior half; anterior margin slightly convexly angular between the rounded corners. Pleural tooth conical, straight.

Anterior area of clypeus larger than the posterior, dividing the latter with a narrow extension down the middle line. Labrum broad antero-caudally at middle, narrowing laterad on each side, with the caudal margin straight and wholly smooth and the anterior margin convex. Palpi of second maxillae relatively short, though longer than

in *M. tahitiensis*; last joint bluntly rounded at end, bearing a well developed claw and about seven stout setae.

Sternal impression deep posteriorly, not furcate anteriorly.

Last sternite broad anteriorly, strongly narrowed caudad, the caudal margin convexly rounded. Coxal pores in the type two on one side, four on the other, the pores small, well separated from each other and from the sternite.

Pairs of legs, 49.

Length, about 25 mm.

LOCALITY: Hawaiian Is.: Waipahee, Kauai. One female taken Jan. 13, 1944 under bark of a dead tree by N. L. H. Krauss.

PACHMYERINIDAE

Genus ZELANION Chamberlin

Zelanium Chamberlin, 1920, Bull. Mus. Comp. Zool., vol. 64, no. 1, p. 39.
Sepedonophilus (part. max.) Attems, 1929, Das Tierreich, Lief. 52, p. 268.

Generotype: ZELANION DUX Chamberlin

This is a genus heretofore known only from New Zealand where it is represented by some ten species. Attems(op.cit.) merges this genus with his *Sepedonophilus*; but it seems adequately distinct in lacking lappets on the syncoxite of the first maxillae and in lacking the conspicuous process of the mesodistal angle of the coxa of the second maxillae.

ZELANION HAWAIIENSIS Chamberlin, new species

Dorsum of type as preserved a somewhat dusky brown, with head and prehensors chestnut and legs yellow.

Frontal suture not evident.

The single clypeal area on anterior border, large, white in color; bearing no setae, but a single seta at caudolateral edge on each side, with no other setae adjacent to this area.

Lateral pieces of labrum nearly meeting in front of the median piece, pectinate throughout length; median piece bearing four dark, stout teeth. First maxillae with syncoxite bearing no lappets; first joint of palpus with a short lappet. Claw of second maxillae long and nearly straight, the articles setose on mesal side.

Prehensors surpassing the head anteriorly; claw armed at base with an acute tooth; prefemur with a nodular tooth at distal end and showing a low, very obtuse prominence at middle; prosternum with sclerotic lines not evident, bearing two teeth anteriorly.

Dorsal plates deeply bisulcate.

Last ventral plate narrow, trapeziform. Each coxa bearing ventrally about twelve simple, well separated, pores of nearly uniform size.

Anal legs of male crassate, but last three joints thinner, the second tarsal slender and bearing a claw.

Pairs of legs, 39.

Length, 28 mm.

LOCALITY: Hawaii. One male.

Differing from the New Zealand *Z. sitocala* (Attems), which in general it resembles, in lacking setae on the clypeal area proper and setae adjacent thereto excepting the two above mentioned, in having four instead of five teeth on the median piece of labrum, and in the fewer, more uniform coxal pores, etc.

Genus PACHYMERIUM C. L. Koch

Pachymerium C. L. Koch, 1847, in Koch-Panzer, Krit. Rev. Ins., vol. 12, pp. 85, 187.

Primarily a palearctic genus.

PACHYMERIUM FERRUGINEUM (C. L. Koch)

Geophilus ferrugineum C. L. Koch, 1835, Deutschl. Crust., Myr. u. Arach., fasc. 3, vol. 2.

Pachymerium ferrugineum C. L. Koch, 1847, in Koch-Panzer, Krit. Rev., vol 3, p. 187.

A widespread palearctic species, common in Europe and North America. It has been found on Hawaii where undoubtedly introduced.

Genus NESOMERIUM, new

A single, finely areolate clypeal area.

Labrum well developed, tripartite; the lateral pieces overlapping the median in front, strongly pectinate throughout; median piece bearing long pectiniform teeth, typically not more strongly sclerotized than those of the lateral pieces. Mandible with three or four pectinate lamellae.

First maxillae apparently lacking palpi; the median processes bearing papillae on mesal surface, without setae. Claw of palpus of second maxillae not pectinate; distal and second joint strongly setose; coxae completely fused.

Ventral pores present in front of caudal margin of sternites.

Last ventral plate very wide. Coxal pores one on each side, this large and simple.

Tarsi of anal legs biarticulate, not bearing a claw.

Genotype: *NESOMERIUM HAWAIIENSE*, new species

Differing from *Pachymerium* in the characters of labrum and first maxillae and in having but a single large coxal pore on each side instead of numerous small ones.

NESOMERIUM HAWAIIENSE Chamberlin, new species

Head longer than wide in about ratio 3.8:3; corners rounded; the width nearly uniform or slightly wider behind than in front; sides weakly convex; anterior margin straight; no frontal suture.

Lateral pieces of labrum nearly meeting at middle in front of middle piece; closely fringed with basally stout, distally fine, teeth; piece bearing 10-12 long, distally fine teeth resembling those of the lateral pieces.

A single median clypeal area, this, in the type, white in color the area small and bearing on middle two erect setae. Coxae of second maxillae completely fused; end of palpus bearing about fifteen rather long, stout setae and a large, simple claw; the adjacent joint with about six syncoxite of the first maxillae in the form of a narrow band lying beneath the anterior border of the syncoxite of the second maxillae; median processes subconical, convex on the outer side, flattened on the inner, this mesal surface bearing numerous papillose processes some of which are rounded or tubercle-like; the first maxillae apparently lacking developed palpi.

Prehensors surpassing the head in front; claw armed at base as is also each of the preceding three joints.

Ventral pores in a transverse area in front of caudal margin of sternites, the area widest at middle and narrowing acutely on each side.

Last ventral plate very wide, subtrapeziform, but its sides strongly convex; the caudal margin straight or slightly concave. One large coxal pore on each side, this wholly covered by the sternite.

In the male the third, fourth, and fifth joints of the anal legs inflated, the two tarsal joints slender.

Pairs of legs, 69.

Length, about 45 mm.

Genus HONUAPHILUS Chamberlin

Honuaphilus Chamberlin, 1926, Bull. Bernice P. Bishop Mus., no. 3, p. 93.

HONUAPHILUS ALOHANUS Chamberlin

Honuaphilus alohanus Chamberlin, 1926, Bull. Bernice P. Bishop Mus., no. 31, p. 93.

Previously reported by the author from Ocean Id., Laysan Id., Johnson Id., and Pearl and Hermes reef, the present collection contains a specimen from Canton Id. in the Phoenix group collected by Mr. Krauss in Oct., 1950.

This species appears to be a beach-dwelling species, and a rather wide distribution on the Pacific islands would not be surprising.

Genus MARSUKOMERUS Attems

Marsukomerus Attems, 1938, Proc. Zool. Soc. London, ser. B, vol. 108, pt. 2, p. 372.

A genus resembling *Honuaphilus* in having a single large coxal pit on each side, but the gland is represented as strictly simple whereas that of *Honuaphilus* is conspicuously composite, numerous independent simple glands opening into the common large tube or cavity, the single labral piece of *Marsukomerus* also is distinctive.

MARSUKOMERUS PACIFICUS Attems

Marsukomerus pacificus Attems, 1938, Proc. Zool. Soc. London, ser. B, vol. 108, pt. 2, p. 373.

The type specimen was taken on Hawaii and provides the only record so far.